

**NOTICE !**

**ALL DRAWINGS  
ARE LOCATED  
AT THE END OF  
THE DOCUMENT**



**NO FURTHER ACCELERATED ACTION JUSTIFICATION FOR ASH PITS****PAC REFERENCE NUMBER(s). SW-133 1, 133 2, 133 4, and 1702**

IHSS Reference Numbers SW-133 1, SW-133 2, SW-133 4, and PAC SW-1702

Unit Name Ash Pits

Approximate Location N748,000, E2,080,000

Date(s) of Operation or Occurrence

1950s - 1968

Description of Operation or Occurrence

In 1970, four burial sites (trenches [SW-133 1, SW-133 2, SW-133 3, and SW-133 4]) were located south of the incinerator area (IHSS 133 5). These trenches were used for disposal of ash (and noncombustible trash) from the incinerator that operated from approximately 1952 until 1968. Noncombustible trash, such as counting discs, broken glassware, and metal, was collected in a nearby dumpster and later disposed of in the trenches. The trenches are approximately 150 to 200 feet long, 12 feet wide, and 10 feet deep, and have been staked with steel fence posts and surveyed. Approximately 3 feet of soil covers each trench location. Two additional burial trenches (PAC SW-1701 and SW-1702) were identified in 1994 (DOE 1996) based on anomalies found during a time-domain electromagnetic (TDEM) conductivity survey. These two additional areas were confirmed through review of aerial photographs and samples collected from boreholes in the immediate area (Figure 1). In addition, two anomalies adjacent to Ash Pits 2 and 4 (IHSSs 133 2 and IHSS 133 4 respectively) were identified based on the TDEM conductivity survey. In each case, the southern most anomaly at each location was referred to as a twin investigation area as documented in the Operable Unit 5 Final Phase 1 RFI/RI Report (DOE 1996). The areas are shown on Figure 1 and are referred to as "Ghost Ash Pits", i.e. SW-133 2 (Ghost) and SW-133 4 (Ghost).

Ash from the incinerator and "dump area" was monitored in 1959 (DOE 1992). Activities of 4,000 counts per minute (cpm) alpha and 30 millirems per hour (mr/hr) beta were observed. Subsequently, the ash was buried in a trench. Special air sampling of the Plant incinerator was conducted in 1958 to address concerns of burning potentially contaminated waste from Buildings 444 and 447.

Physical/Chemical Description of Constituents Released

In September 1954, five ash samples from the burning of Building 991 wastes were collected. The average activity of the ash was  $4.5 \times 10^7$  disintegrations per minute per kilogram (dpm/kg) of dry ash. The alpha activity of the ash was approximately 100 times higher than the usual ash samples from the incinerator.



May 20, 2003

DOCUMENT CLASSIFICATION  
REVIEW WAIVER PER  
CLASSIFICATION OFFICE  
CEX-105-01

ADMIN RECORD

1

OU05-A-000714

1/29



In 1956, special monitoring was performed during and after contaminated waste was burned in the Plant incinerator. Ash samples indicated 1.9 grams of radioactive material (depleted uranium) per kilogram of ash. Smear surveys of the incinerator before and after burning showed no increase in contamination. It was estimated that approximately 30,000 cubic feet of soil and ash were buried in the trenches.

Small quantities of depleted uranium-contaminated combustibles were burned along with the general combustible Plant refuse. One estimate indicates that less than 100 grams of depleted uranium were in the combustibles. A monthly ash sampling program was initiated in January 1962 and indicated there was 1 to 8 kilograms of depleted uranium per ton of ash (DOE 1992).

#### Responses to Operation or Occurrence

Sampling events were conducted from November 24, 1953, through December 9, 1954. In 1970, the locations of Ash Pits 1-1 through 1-4 were marked in the field. The ash in these trenches was evaluated and considered to present no problems unless disturbed and inhaled.

#### Fate of Constituents Released to Environment

The 2001 Annual Update for the Historical Release Report (HRR) provides an NFA determination assessment for all of the Ash Pits. Based on the data and assessment provided in that update, NFAs were approved by the regulatory agencies for Ash Pit 3 (SW-133.3) and the Recently Identified Ash Pit (TDEM-1) [SW-1701] (EPA, CDPHE, 2002). Analytical data specific to the Ghost pits was submitted in the 2002 Annual Update for the HRR, which indicates that all data are below Tier II soil action levels. The agencies agreed that these areas are not PACs, and they have been removed from the maps/plates in the HRR. The regulatory agencies determined that additional data needed to be collected to render a NFA determination for the Incinerator Facility (SW-133.5) and the Concrete Wash Pad (SW-133.6).

Because of proposed modifications to RFCA Attachment 5, specifically, the introduction of new Action Levels (ALs) and the integrated risk-based approach (application of the Soil Risk Screen), Ash Pit 1 (SW-133.1), Ash Pit 2 (SW-133.2), Ash Pit 4 (SW-133.4), and the Recently Identified Ash Pit (TDEM-2) [SW-1702] have been reassessed to render a No Further Accelerated Action (NFAA) determination. No additional data has been included in the reassessment of these PACs relative to that included in the 2001 Annual Update for the HRR. RFCA Action levels (ALs) are from the proposed modifications to RFCA Attachment 5, dated November 12, 2002 (DOE, 2002). Background levels for subsurface soil and groundwater (total concentrations for Upper Hydrostratigraphic Unit) are from the Background Geochemical Characterization Report (DOE 1993a). Background values for surface soils and sediments are from Geochemical Characterization of Background Surface Soils Background Soils Characterization Program (DOE 1995). All background values used for comparison are the mean background value plus two standard deviations. Table 1 lists the trenches and associated boreholes and/or wells.



## **SURFACE SOIL ASSESSMENT**

Results from analysis of 18 surface soil samples from across the ash pit area indicate, with the exception of one sediment sample where arsenic is 17.3 mg/kg (bkg – 13.1 mg/kg), that metals are not present above background. This one exceedance above background is below the AL of 21.6 mg/kg. In addition to laboratory analysis for radionuclides, a High Purity Germanium (HPGe) survey of the entire area was conducted in 1993. Figures 2, 3 and 4 show the survey results for americium-241, uranium-235, and uranium-238. Americium was not detected at statistically significant levels. This result suggests the absence of plutonium. Concentrations of the uranium isotopes were all well below the ALs. Consequently, the excavation of surface soil is not required.

## **APPLICATION OF THE SOIL RISK SCREEN FOR SUBSURFACE SOIL**

### **Screen 1 – Are Contaminant of Concern (COC) Concentrations Below Table 3 Wildlife Refuge Worker (WRW) Soil Action Levels?**

No. As shown in Tables 2 through 5 and Figures 4a through 4d, concentrations of uranium isotopes and a few metals in pit material buried to a depth of approximately 3 feet exceed the ALs as follows:

**SW-133 1** – Uranium-235 and Uranium-238 (Table 2)

**SW-133 2** – Chromium, Uranium-235 and Uranium-238 (Table 3)

**SW-133 4** – Uranium-235 and Uranium-238 (Table 4)

**SW-1702** - Chromium, Lead, and all of the Uranium isotopes (Table 5)

### **Screen 2 – Is there potential for subsurface soil to become surface soil?**

Yes. As shown in Figure 5, the ash pits are located in an area that was mapped as being prone to landslides.

**Evaluate accelerated action in accordance with Section 4 C and 5 C and consider any subsequent screens in the evaluation, as appropriate.**

As noted in Screen 1, the maximum concentrations of uranium isotopes and a few metals exceed the ALs at the Ash Pits. However, with the exception of PACs SW-133 2 and SW-1702, the average concentrations are well below the ALs. At SW-133 2, the average chromium concentration (429.7 mg/kg) exceeds the AL of 268 mg/kg. However, the average concentration is 1/20<sup>th</sup> of the maximum concentration indicating the maximum chromium concentration is an isolated zone of contamination not representative of the balance of the material present in the PAC. At SW-1702, the average concentration of lead (1223 mg/kg) and uranium-235 (9.7 pCi/g) exceed their respective ALs (1000 mg/kg and 8



pCi/g) However, these exceedances are relatively small, i.e., they are within 20 - 25% of the ALs

Although the Ash Pits are located in an area that has been mapped as a landslide deposit, a visual inspection of the area indicates it has a broad, gently sloping (~8% grade) surface, with no evidence of recent landslide activity. Also, the area has a well-established vegetative cover, which will minimize erosion from runoff.

Because the Ash Pits are near Woman Creek, bank erosion and eventual down-cutting into the Ash Pits is another potential mechanism to expose contaminated subsurface soil. However, the closest Ash Pit, SW-133.6 [not under evaluation here], is 80 – 100 ft from the creek. Over the past 60 years, there is no discernable bank erosion based on overlaying a relatively recent aerial photo transparency (ca. 1992) on a 1937 aerial photo with the same scale. Furthermore, the Ash Pits are outside the 100 year floodplain (Figure 6).

One final mechanism to be addressed with respect to potential exposure of subsurface contaminated soil is the action of burrowing animals. Typically, prairie dogs burrow to depths of approximately 6 feet and thus potentially bring contaminated subsurface soil to the surface. However, it must be recognized that the Ash Pits area is relatively small (~20 acres) compared to the human exposure unit sizes being considered for the comprehensive risk assessment (on the order of several hundred acres). Accordingly, the incremental impact from this activity is small. Furthermore, any soil that would be brought to the surface would be mixed with uncontaminated overlying soil during the burrowing activity.

### **Screen 3 – Does subsurface soil radiological contamination exceed criteria in Section 5.3 and Attachment 14?**

No. As shown in Tables 2 through 5, plutonium and americium concentrations are well below the soil ALs of 50 and 76 pCi/g respectively, and therefore, further analysis is not required.

Some uranium isotopes, as noted in Screen 1, exceed soil ALs, however, approximately three feet of uncontaminated to slightly contaminated soils were previously placed over the pit materials. This cover sufficiently protects the wildlife refuge worker from direct exposure and eliminates the need for an accelerated action.

### **Screen 4 – Is there an environmental pathway and sufficient quantity of COC that would cause exceedance of surface water standards (SWS)?**

No. Although a groundwater treatment system is not and will not be in place to intercept groundwater from the Ash Pits, groundwater does not appear to be a significant pathway for COC migration to surface water. Current groundwater monitoring does not indicate groundwater contamination in this area, however, the number and location of groundwater wells will be evaluated between now and Site closure.



Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by the Ash Pits. The erosion pathway can be eliminated because surface soil is largely uncontaminated in the vicinity of the Ash Pits (see Surface Soil Assessment), and deep erosion is unlikely as discussed in the evaluation presented in Screen 2. However, because groundwater is a possible pathway whereby Woman Creek could become contaminated by the Ash Pits, groundwater chemistry has been evaluated for evidence of contamination. Subsequently, Woman Creek surface water quality is assessed.

#### Downgradient Groundwater Quality

Data from wells in the vicinity of the Ash Pits were evaluated to determine whether there is an impact to groundwater. Groundwater quality data are summarized in Table 7, and are discussed with respect to each of the PACs below.

**SW-133 1 (and SW-133.3)** - One well, 56294, is immediately downgradient of these PACs. No contaminants were detected above RFCA Tier I ALs and only thallium (5.9 ug/l) was found above the Tier II AL (2 ug/l). However, the thallium concentration exceeds background (5.19 ug/l) by a small percentage. Furthermore, thallium is not a soil contaminant at SW-133 1 (Table 2). It is also not a contaminant at SW-133 3 (see 2001 Annual Update for the HRR).

**SW-133 2** - Downgradient of this PAC, aluminum concentrations in groundwater were greater than the RFCA Tier II AL in well 58793 (range 44,900 - 64,200 ug/l), thallium was reported once at a concentration greater than the RFCA Tier II AL in well 63793 (4.3 ug/l), and uranium-233,234 and uranium-238 concentrations (all less than 5 pCi/l) were greater than RFCA Tier II ALs in wells 58793, 63693, and 63793 downgradient of this PAC. Although the aluminum concentration exceeded background (11,240 ug/l), thallium did not exceed background (5.19 ug/l). Also, aluminum and thallium are not soil contaminants at PAC 133 2 (Table 3). With respect to the uranium isotopes, although the concentrations exceed the Tier II ALs, they are well below background (uranium-233,234 [93 pCi/l], uranium-238 [66 pCi/l]). Furthermore, although uranium-233/234 and uranium-238 have maximum soil concentrations that are well above background, the average concentrations are more than an order of magnitude less, i.e., the significant uranium contamination in the subsurface soil is isolated, and therefore, the PAC does not appear to be a significant source for groundwater uranium contamination.

**SW-133 4 and SW-1702** - The nearest downgradient well (63093) contained methylene chloride concentrations above detection limit and uranium-233/234 and uranium-238 concentrations above Tier II ALs. This well was sampled numerous times, and methylene chloride was only detected once. Additionally, methylene chloride is unlikely to be present in incinerator ash. Like SW-133 2, the uranium isotopes are at concentrations well below background. Also, although the maximum concentrations for all three uranium isotopes are well above background in subsurface soil at PAC SW-133 4 (Table 4) and SW-1702 (Table 5), the average concentrations are approximately an order of magnitude less. Again, the significant uranium contamination in the subsurface soil at these PACs is isolated, and



therefore, the PACs do not appear to be significant sources for groundwater uranium contamination

More recent data was collected for well 63093 and well 5686 directly downgradient in the Woman Creek drainage (Table 8) The new uranium data for well 63093 indicates similar uranium concentrations to that of previous data The concentrations of these uranium isotopes further downgradient in the drainage (5686) are lower and below Tier II ALs

#### Downgradient Surface Water Quality

As shown in Table 9, aluminum, antimony, cadmium, copper, iron, lead, manganese, mercury, silver, americium-241, gross alpha, gross beta, and plutonium- 239/240 concentrations in nearby surface water locations have occurred at concentrations exceeding the surface water ALs However, the previous analysis regarding surface soil, subsurface soil, and groundwater contamination strongly suggests that the Ash Pits are not a source for metal and radionuclide contamination in surface water Furthermore, water quality data at downgradient station SW027 (surface water point of evaluation [POE]) and at Pond C-2, indicate these contaminants have never been detected above RFCA surface water ALs

#### **Screen 5 – Are COC concentrations above Table 3 Action Levels for ecological receptors?**

At this time, ecological ALs are not available for all receptors/chemical combinations, however, values are available for a small subset of chemicals Screen 5 currently evaluates only this subset, and the remainder will be addressed through the ecological risk assessment portion of the Comprehensive Risk Assessment (CRA)

As shown below, maximum concentrations for beryllium and lead exceed the ecological ALs in all of the Ash Pits, and in most cases, the average concentrations also exceed the ALs as well as background The highest concentrations of lead and beryllium are observed in PAC 1702 where the average concentrations exceed the ALs by more than an order of magnitude (Table 5)

PAC	COC	Max. Conc. Exceeds Ecological AL?	Avg. Conc. Exceeds Ecological AL?	Avg. Conc. Exceeds Background ?
SW-133 1	Beryllium	Yes	No	No
SW-133 1	Lead	Yes	Yes	Yes
SW-133 2	Beryllium	Yes	Yes	Yes
SW-133 2	Lead	Yes	Yes	Yes
SW-133 4	Beryllium	Yes	No	No
SW-133 4	Lead	Yes	Yes	Yes
SW-1702	Beryllium	Yes	Yes	Yes
SW-1702	Lead	Yes	Yes	Yes



**Evaluate accelerated action in accordance with Section 4.2.C and 5.3.I and consider any subsequent screens in the evaluation, as appropriate**

Per Section 4.2.C of Attachment 5, DOE will consider the target species and the exposure unit for that species, and the location, areal extent, and concentration of contamination in evaluating and determining appropriate accelerated actions necessary to protect ecological resources

SW-1702 material contains average lead and beryllium concentrations that significantly exceed the ecological ALs. As a first step in evaluating the risk posed to the ecological receptors, the ecological receptor that is the basis for the AL was identified

**Beryllium**

The beryllium AL of 2.15 mg/kg is based on protection of the prairie dog<sup>1</sup>

**Lead**

The lead AL of 25.6 mg/kg is based on protection of the American Kestrel. Because the American Kestrel, a bird of prey would not be directly exposed to the buried material, Preliminary Remediation Goals (PRGs) for other ecological receptors were examined<sup>2</sup>. The PRGs for protection of the prairie dog and Preble's Meadow Jumping Mouse (PMJM) are 149 mg/kg and 642 mg/kg, respectively

As can be seen from Tables 2 through 5, SW-1702 has significantly higher concentrations of beryllium and lead than the other Ash Pits, and the average concentrations exceed the AL/PRG for burrowing animals (the PMJM-based PRG for beryllium is 8.71 mg/kg). Although the concentrations of these COCs exceed the PRGs for protection of the PMJM, the mouse typically burrows to a depth of only 15 inches, and the buried material is 3 feet below ground surface at the Ash Pits per the Historical Release Report (DOE 1992). Therefore, it is unlikely that the PMJM will be exposed to the material. Furthermore, the areal extent of SW-1702 is relatively small compared to the habitat areas on Site, and accordingly, the risk to the PMJM (and prairie dog) is also proportionately low. Lastly, SW-1702 is in a PMJM habitat, and it is uncertain that removal of the buried material and disruption of the habitat would result in a net benefit to the PMJM.

**Stewardship Analysis**

Application of the Soil Risk Screen to the Ash Pits, specifically Ash Pit 1 (SW-133.1), Ash Pit 2 (SW-133.2), Ash Pit 4 (SW-133.4), and the Recently Identified Ash Pit (TDEM-2) [SW-1702], indicates No Further Accelerated Action (NFAA) is necessary for protection of public health and environment. However, because subsurface soil at some of these PACs

---

<sup>1</sup> It should be noted that the background beryllium concentration for subsurface soil is 14.2 mg/kg which exceeds the AL. In this case and in all cases where background levels exceed the AL for protection of ecological receptors, achieving background levels becomes the cleanup goal.

<sup>2</sup> The AL is the lowest PRG above Site background levels that was calculated for each of the five selected wildlife receptors judged to be representative of species at RFETS: Preble's meadow jumping mouse and black-tailed prairie dog (fossorial [burrowing] small mammals), mourning dove (small ground-feeding bird), terrestrial invertebrate (multiple species), and American kestrel (avian predator). See also footnote 1.



has contaminant concentrations that exceed soil ALs, both near-term and long-term stewardship actions have been recommended<sup>3</sup> They are discussed below

### **Near-Term Management Recommendations**

Near-term recommendations for environmental stewardship include the following

- Continued groundwater monitoring to evaluate potential impacts to surface water quality,
- Excavation at the area will continue to be controlled through the Site Soil Disturbance Permit process, and
- Site access and security controls will remain in place pending implementation of long-term controls

### **Long-Term Stewardship Recommendations**

Based on remaining environmental conditions at the Ash Pits, no specific long-term stewardship activities are recommended beyond the generally applicable Site requirements that may be imposed on this area in the future, which are dependent upon the final remedy selected Institutional controls that may be used as appropriate for this area include the following

- Prohibitions on construction of buildings,
- Restrictions on excavation or other soil disturbance,
- Prohibitions on groundwater pumping in the area of the Ash Pits, and
- Monitoring for or prevention of intrusion by burrowing animals

It is also proposed that the groundwater monitoring network in the vicinity of the Ash Pits be evaluated between now and Site closure to determine its adequacy in detecting releases from the Ash Pits A new well(s) will be added if appropriate Furthermore, a marker will be placed near the southwestern corner of the western most Ash Pit to monitor bank erosion, if any, that may occur These specific long-term stewardship recommendations will also be summarized in the Rocky Flats *Long Term Stewardship Strategy* No engineered controls, other environmental monitoring, or physical controls (e g , fences) are recommended as a result of the conditions remaining at the Ash Pits

The Ash Pits will be evaluated as part of the Sitewide Comprehensive Risk Assessment, which is part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) and Corrective Measures Study/Feasibility Study (CMS/FS) that will be conducted for the Site The need for and extent of any, more general, long-term stewardship activities will also be analyzed in RFI/RI and CMS/FS and will be proposed as part of the preferred alternative in the Proposed Plan for the Site Institutional controls and other long-term stewardship requirements for Rocky Flats will ultimately be contained in the Corrective

---

<sup>3</sup> The Ash Pits are contiguous with the Industrial Area (IA) where subsurface soil contaminant concentrations will likely exceed soil ALs at some locations Considering the large size of the IA relative to the Ash Pits, there would be no significant reduction in the area requiring near-term and long-term stewardship actions if the contaminated subsurface soil at the Ash Pits were removed



Action Decision/Record of Decision, in any post-closure Colorado Hazardous Waste Act permit that may be required, and in any post-RFCA agreement

#### NFAA Summary

Ash Pit 1 (SW-133 1), Ash Pit 2 (SW-133 2), Ash Pit 4 (SW-133 4), and the Recently Identified Ash Pit (TDEM-2) [SW-1702] are proposed for NFAA. The Soil Risk Screen and soil ALs proposed in the RFCA Attachment 5 Modification dated 11/12/02 have been applied to these PACs. The risk screen shows an insignificant potential adverse risk to a wildlife refuge worker because the waste is buried, and the Ash Pits area, although located in a landslide deposit, is in a stable configuration having a gently slope, and a well established vegetative cover to minimize erosion. It is possible a burrowing animal may bring contaminated soil to the surface, however, the incremental risk to the wildlife refuge worker is small because the Ash Pits area is relatively small compared to the exposure unit size for the worker. Although concentrations of lead and beryllium exceed the Preble's Meadow Jumping Mouse (and prairie dog) PRGs, particularly in PAC 1702, the mouse typically burrows to a depth of only 15 inches, and there is 3 feet of soil cover on the Ash Pit. Furthermore, the volume of waste and areal extent of PAC 1702 is relatively small, and accordingly, the risk to the Preble's Meadow Jumping Mouse is also proportionately low. There is little potential for contaminated runoff to impact surface water quality because the waste is buried and covered, the Ash Pits are located far enough from Woman Creek that it is unlikely that bank erosion would impact the Ash Pits, and they are located outside the 100 year flood plain. Examination of groundwater quality indicates a potential for low level uranium contamination that may have arisen from the Ash Pits, but no impacts from other contaminants. However, uranium is not a contaminant that exceeds surface water ALs in Woman Creek, and therefore, there is no apparent impact to surface water quality from the Ash Pits. Application of the Soil Risk Screen indicates no further accelerated action is required.

#### References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE 1993a, *Background Geochemical Characterization Report*, Golden, CO, September

DOE 1993b, *Draft Final Technical Memorandum 4, Addendum to Final Phase I RFI/RI Work Plan, Surface Soil Sampling Plan – Ash Pits, Incinerator, and Concrete Wash Pad*, Rocky Flats Plant, Woman Creek Priority Drainage Operable Unit No. 5, March 1993

DOE 1995, *Geochemical Characterization of Background Surface Soils Background Soils Characterization Program*, Golden, CO, May

DOE, 1996, *Final Phase I RFI/RI Report, Woman Creek Drainage, Operable Unit 5, Vol 1*, Rocky Flats Environmental Technology Site, Golden, CO, April



EPA, CDPHE, 2002 Correspondence to J Legare, DOE RFO, from T Rehder, EPA Region VIII, S Gunderson, CDPHE, RE *Approval of NFA Designation for IHSSs & PACs*, February 14, 2002



**Table 1- Subsurface Soil Sampling Locations for Ash Pits**

<b>IHSS/PAC Number</b>	<b>Borehole Locations</b>
133 1	56293, 56393, 56493, 58893
133 2	56893, 56993, 57093, 57294
133 4	55694, 55893, 55993, 56093
SW-1702	55894, 55994, 56094



**Table 2 - Summary of Analytical Results for Subsurface Soil at SW-133 1**

Analyte*	Samples Above Detection Limit	Maximum Concentration	Unit	Average Concentration	Action Level	Background Concentration
Aluminum	11	24300	mg/kg	9820 9	228000	35373 2
Americium 241	1	1	pCi/g	1	76/1 900**	0 02
Antimony	2	33	mg/kg	26 5	409	17 0
Arsenic	11	14	mg/kg	3 5	22 2/21 6**	13 1
Barium	11	374	mg/kg	159 7	26400	289 4
Beryllium	7	4	mg/kg	1 4	921/2 15**	14 2
Cadmium	3	57	mg/kg	20 7	962	1 7
Calcium	11	24600	mg/kg	7166 4		39382 3
Cesium	1	13	mg/kg	13 0		
Chromium	11	41	mg/kg	11 5	268	68 3
Cobalt	11	37	mg/kg	11 0	1550	29 0
Copper	11	2920	mg/kg	298 6	40900	38 2
Gross Alpha	12	742	pCi/g	78 9		43 5
Gross Beta	12	1580	pCi/g	171 0		36 8
Iron	11	31100	mg/kg	13932 7	307000	41046 5
Lead	11	260	mg/kg	52 2	1000/25 6**	25 0
Lithium	11	8	mg/kg	5 0	20400	34 7
Magnesium	11	4670	mg/kg	2595 5		9315 4
Manganese	11	696	mg/kg	228 5	3480	901 6
Molybdenum	1	24	mg/kg	24 0	5110	25 6
Nickel	10	66	mg/kg	21 3	20400	62 2
Plutonium 239/240	1	1	pCi/g	1	50	0 02
Potassium	11	1680	mg/kg	986 5		6196 8
Silver	3	158	mg/kg	57 3	5110	24 5
Sodium	11	741	mg/kg	394 7		1251 2
Strontium	11	96	mg/kg	52 7	613000	211 4
Thallium	1	1	mg/kg	1		1 8
Tin	1	16	mg/kg	16 0	613000	286 3
Uranium 234	13	127	pCi/g	20 8	300/1,800**	2 6
Uranium 235	11	20	pCi/g	2 0	8/1 900**	0 12
Uranium 238	13	1210	pCi/g	192 3	351/1,600**	1 5
Vanadium	11	58	mg/kg	24 4	7150/433**	88 49
Zinc	11	891	mg/kg	136 4	307000	139 1


Max Conc Above  
Background

Max Conc Above  
Action Level

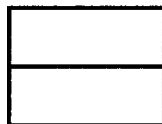
\* Subsurface soil samples were analyzed for Target Analyte List (TAL) metals gross alpha and beta uranium 233 234 uranium 235 uranium 238 americium 241 and plutonium 239 240 Analytes shown are only those that were detected The average concentrations are computed from the detected values only

\*\*AL for protection of wildlife refuge worker/AL for protection of ecological receptor



**Table 3 - Summary of Analytical Results for Subsurface Soils at SW-133 2**

	Number of Samples above Detection Limit	Maximum	Unit	Average	Action Level	Background
Aluminum	20	17400	mg/kg	11160	228000	35373 17
Americium 241	1	5	pCi/g	5	76/1 900**	0 02
Antimony	3	149	mg/kg	55 3	409	16 97
Arsenic	20	8	mg/kg	3 5	22 2/21 6**	13 14
Barium	20	414	ug/Kg	151 7	26400	289 38
Beryllium	20	131	mg/kg	16 4	921/2 15**	14 2
Cadmium	6	25	mg/kg	10 7	962	1 7
Calcium	20	8580	mg/kg	3632 0		39382 27
Chromium	20	8310	mg/kg	429 7	268	68 3
Cobalt	20	68	mg/kg	11 3	1550	29 04
Copper	20	1380	mg/kg	108 0	40900	38 21
Gross Alpha	21	191	pCi/g	27 2		43 5
Gross Beta	21	662	pCi/g	65 8		36 8
Iron	20	85800	mg/kg	20031	307000	41046 52
Lead	20	878	mg/kg	81 7	1000/25 6**	24 97
Lithium	17	14	mg/kg	7 6	20400	34 66
Magnesium	20	4450	mg/kg	2714 0		9315 44
Manganese	20	1260	mg/kg	254	3480	901 62
Molybdenum	4	470	mg/kg	151 25	5110	25 61
Nickel	20	4750	mg/kg	254 0	20400	62 21
Plutonium 238	1	10	pCi/g	10		
Plutonium 239/240	2	1	pCi/g	1	50	0 02
Potassium	19	2290	mg/kg	1573 9		6196 81
Selenium	1	1	mg/kg	1 0	5110	4 8
Silver	4	190	mg/kg	65 5	5110	24 54
Sodium	18	1200	mg/kg	274 9		1251 24
Strontium	20	44	mg/kg	26 5	613000	211 38
Tin	2	36	mg/kg	30 0	613000	286 31
Uranium 234	21	106	pCi/g	8 5	300/1 800**	2 6
Uranium 235	21	38	pCi/g	2 0	8/1 900**	0 12
Uranium 238	22	1160	pCi/g	58 7	351/1 600**	1 5
Vanadium	20	57	mg/kg	32 6	7150/433**	88 49
Zinc	20	1290	mg/kg	170 4	307000	139 1



Max Conc Above  
Background

Max Conc Above  
Action Level

\* Subsurface soil samples were analyzed for Target Analyte List (TAL) metals gross alpha and beta uranium 233 234 uranium 235 uranium 238 americium 241 and plutonium 239 240 Analytes shown are only those that were detected The average concentrations are computed from the detected values only

\*\*AL for protection of wildlife refuge worker/AL for protection of ecological receptor



**Table 4 - Summary of Analytical Results for Subsurface Soils at SW-133 4**

Analyte	Number of Samples above Detection Limit	Maximum Concentration	Unit	Average Concentration	Action Level	Background Concentration
Aluminum	11	21200	mg/kg	12253 6	228000	35373 2
Antimony	4	28	mg/kg	16 0	409	17 0
Arsenic	11	8	mg/kg	3 9	22 2/21 6**	13 1
Barium	11	637	mg/kg	199 9	26400	289 4
Beryllium	7	4	mg/kg	2 1	921/2 15**	14 2
Cadmium	6	42	mg/kg	18 3	962	1 7
Calcium	11	15100	mg/kg	6572 7		39382 3
Cesium	1	17	mg/kg	17 0		
Chromium	11	62	mg/kg	22 6	268	68 3
Cobalt	11	34	mg/kg	11 5	1550	29 0
Copper	11	2520	mg/kg	609 5	40900	38 2
Gross Alpha	12	363	pCi/g	109 6		43 5
Gross Beta	12	606	pCi/g	172 6		36 8
Iron	11	107000	mg/kg	29549 1	307000	41046 5
Lead	11	935	mg/kg	149 2	1000/25 6**	25 0
Lithium	5	18	mg/kg	11 0	20400	34 7
Magnesium	11	5190	mg/kg	3228 2		9315 4
Manganese	11	998	mg/kg	326 7	3480	901 6
Mercury	1	1	mg/kg	1	25200	1 5
Molybdenum	4	20	mg/kg	13 5	5110	25 6
Nickel	11	93	mg/kg	32 7	20400	62 2
Plutonium 239/240	1	1	pCi/g	1	50	0 02
Potassium	8	2280	mg/kg	1416 1		6196 8
Silicon	3	368	mg/kg	316 0		
Silver	6	311	mg/g	81 7	5110	24 5
Sodium	10	1220	mg/kg	648 2		1251 2
Strontium	11	72	mg/kg	42 7	613000	211 4
Tin	4	579	mg/kg	168 0	613000	286 3
Uranium 234	10	241	pCi/g	50 5	300/1 800**	2 6
Uranium 235	10	17	pCi/g	4 5	8/1,900**	0 12
Uranium 238	10	848	pCi/g	150 1	351/1 600**	1 5
Vanadium	11	60	mg/kg	33 0	7150/433**	88 5
Zinc	11	2390	mg/kg	531 2	307000	139 1


Max Conc Above  
Background

Max conc Above  
Action Level

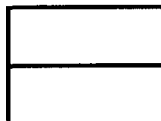
\* Subsurface soil samples were analyzed for Target Analyte List (TAL) metals gross alpha and beta uranium 233 234 uranium 235 uranium 238 americium 241 and plutonium 239 240 Analytes shown are only those that were detected The average concentrations are computed from the detected values only

\*\*AL for protection of wildlife refuge worker/AL for protection of ecological receptor



**Table 5 - Summary of Analytical Results for Subsurface Soils at SW-1702**

Analyte	Number of Samples above Detection Limit	Maximum Concentration	Unit	Average Concentration	Action Level	Background Concentration
Aluminum	9	28600	mg/kg	17514 4	228000	35373 1
Americium 241	1	3	pCi/g	3	76/1 900**	0 02
Antimony	2	16	mg/kg	11 5	409	17 0
Arsenic	9	21	mg/kg	10 0	22 2/21 6**	13 1
Barium	9	1680	mg/kg	509 7	26400	289 4
Beryllium	9	446	mg/kg	91 4	921/2 15**	14 2
Cadmium	7	71	mg/kg	27 0	962	1 7
Calcium	9	24700	mg/kg	8977 8		39382 3
Cesium	6	9	mg/kg	6 2		
Chromium	9	434	mg/kg	99 6	268	68 3
Cobalt	9	701	mg/kg	148 6	1550	29 0
Copper	9	8850	mg/kg	2081 4	40900	38 2
Gross Alpha	11	418	pCi/g	116 4		43 5
Gross Beta	11	899	pCi/g	276 5		36 8
Iron	9	106000	mg/kg	40500 0	307000	41046 5
Lead	9	5200	mg/kg	1223 4	1000/25 6**	25 0
Lithium	9	14	mg/kg	10 6	20400	34 7
Magnesium	9	11700	mg/kg	4656 7		9315 4
Manganese	9	2150	mg/kg	588 6	3480	901 6
Molybdenum	5	68	mg/kg	34 4	5110	25 6
Nickel	9	325	mg/kg	94 1	20400	62 2
Plutonium 239/240	4	7	pCi/g	3 5	50	0 02
Potassium	9	3950	mg/kg	1734 0		6196 8
Selenium	3	7	mg/kg	5 3	5110	4 8
Silicon	3	704	mg/kg	503 0		
Silver	8	209	mg/kg	74 5	5110	24 5
Sodium	9	3360	mg/kg	1254 1		1251 2
Strontium	9	102	mg/kg	54 1	613000	211 4
Thallium	5	7	mg/kg	3 4		1 8
Tin	7	102	mg/kg	49 6	613000	286 3
Uranium 234	11	350	pCi/g	63 8	300/1 800**	2 6
Uranium 235	11	68	pCi/g	9 7	8/1,900**	0 12
Uranium 238	11	940	pCi/g	177 0	351/1 600**	1 5
Vanadium	9	60	mg/kg	36 2	7150/433**	88 5
Zinc	9	7220	mg/kg	1802 6	30700	139 1



Max Conc Above  
Background

Max Conc Above  
Action Level

\* Subsurface soil samples were analyzed for Target Analyte List (TAL) metals gross alpha and beta uranium 233 234 uranium 235 uranium 238 americium 241 and plutonium 239 240 Analytes shown are only those that were detected The average concentrations are computed from the detected values only

\*\*AL for protection of wildlife refuge worker/AL for protection of ecological receptor



**Table 7 - Summary of Analytical Results Above Tier II Action Levels for  
Groundwater at the Ash Pits**

Location	Collection Date	Description	Result	Units	Above Tier I	Above Tier II	Tier I	Tier II
<b>IHSS-133.1 and 130.2</b>								
56294	4/27/95	Thallium	5.9	ug/L	No	Yes	200	2
<b>IHSS-133.2</b>								
58793	3/7/95	Aluminum	44900.0	ug/L	No	Yes	3.65E+06	3.65E+04
58793	8/12/93	Aluminum	64200.0	ug/L	No	Yes	3.65E+06	3.65E+04
63793	5/1/95	Thallium	4.3	ug/L	No	Yes	200	2
63693	1/18/95	Uranium-233,-234	1.3	pCi/L	No	Yes	106	1.06
63793	1/4/95	Uranium-233,-234	1.4	pCi/L	No	Yes	106	1.06
63793	5/1/95	Uranium-233,-234	4.1	pCi/L	No	Yes	106	1.06
58793	8/12/93	Uranium-238	0.8	pCi/L	No	Yes	76.8	0.768
58793	6/18/93	Uranium-238	1.1	pCi/L	No	Yes	76.8	0.768
58793	1/6/95	Uranium-238	3.6	pCi/L	No	Yes	76.8	0.768
63693	1/18/95	Uranium-238	1.3	pCi/L	No	Yes	76.8	0.768
63793	1/4/95	Uranium-238	1.1	pCi/L	No	Yes	76.8	0.768
63793	5/1/95	Uranium-238	2.9	pCi/L	No	Yes	76.8	0.768
<b>IHSS-130.2 - ASY-101</b>								
63093	3/30/94	Methylene Chloride	13.0	ug/L	No	Yes	500	5
63093	5/24/95	Uranium-233,-234	3.3	pCi/L	No	Yes	106	1.06
63093	5/24/95	Uranium-238	2.4	pCi/L	No	Yes	76.8	0.768



**Table 8 - Uranium Concentrations in Groundwater Downgradient of SW-133.4 and  
SW-1702 (August 2001)**

Analyte	Result	Unit	Minimum Detection Activity	Tier I Action Level	Tier II Action Level
<b>Well 5686</b>					
<b>Uranium-233,-234</b>	0.65	pCi/L	0.046	106	1.06
<b>Uranium-235</b>	U	pCi/L	0.060	135	24
<b>Uranium-238</b>	0.53	pCi/L	0.046	586	103
<b>Well 63093</b>					
<b>Uranium-233,-234</b>	2.58	pCi/L	0.068	106	1.06
<b>Uranium-235</b>	0.093	pCi/L	0.048	135	24
<b>Uranium-238</b>	1.92	pCi/L	0.014	586	103



**Table 9 – Analytes Detected Above Action Levels in Surface Water Near the Ash Pits**

Location	Collection Date	Description	Result	Units	Standard
<b>Metals</b>					
SW041	8/6/90	Aluminum	90.6	ug/L	87
SW041	8/6/90	Aluminum	99.1	ug/L	87
SW039	4/12/90	Aluminum	238	ug/L	87
SW041	4/5/90	Aluminum	631	ug/L	87
SW040	7/30/87	Aluminum	2500	ug/L	87
SW041	9/5/90	Antimony	11.4	ug/L	6
SW039	11/8/90	Antimony	14.7	ug/L	6
SW039	9/13/90	Antimony	22.4	ug/L	6
SW041	7/8/91	Antimony	29	ug/L	6
SW039	9/13/90	Antimony	14.4	ug/L	6
SW039	11/8/90	Antimony	15.6	ug/L	6
SW041	6/4/91	Cadmium	1.9	ug/L	1.5
SW041	7/8/91	Cadmium	2	ug/L	1.5
SW039	6/4/91	Copper	16	ug/L	16
SW041	6/4/91	Copper	28	ug/L	16
SW041	8/5/91	Iron	1010	ug/L	1000
SW041	9/5/91	Iron	1100	ug/L	1000
SW041	4/5/90	Iron	1320	ug/L	1000
SW041	12/4/90	Iron	13900	ug/L	1000
SW041	12/4/90	Iron	13900	ug/L	1000
SW041	11/20/89	Iron	15900	ug/L	1000
SW041	2/6/90	Iron	1970	ug/L	1000
SW041	6/16/89	Iron	2090	ug/L	1000
SW041	5/3/91	Iron	2670	ug/L	1000
SW041	5/3/91	Iron	2670	ug/L	1000
SW041	2/6/90	Iron	3550	ug/L	1000
SW039	12/4/90	Iron	5390	ug/L	1000
SW039	12/4/90	Iron	5390	ug/L	1000
SW041	5/26/89	Iron	5480	ug/L	1000
SW041	6/4/90	Iron	6800	ug/L	1000
SW041	12/5/89	Iron	8180	ug/L	1000
SW039	11/18/91	Lead	8	ug/L	6.5
SW039	12/20/89	Lead	7.3	ug/L	6.5
SW041	12/5/89	Lead	6.6	ug/L	6.5
SW041	12/4/90	Manganese	1100	ug/L	1000
SW041	12/4/90	Manganese	1100	ug/L	1000



**Table 9 - Analytes Detected Above Action Levels in Surface Water Near the Ash Pits  
(cont )**

Location	Collection Date	Description	Result	Units	Standard
SW039	11/17/89	Mercury	0 33	ug/L	0 01
SW041	5/26/89	Mercury	0 44	ug/L	0 01
SW039	4/6/89	Mercury	0 3	ug/L	0 01
SW041	3/1/89	Mercury	1 1	ug/L	0 01
SW039	3/21/90	Mercury	0 25	ug/L	0 01
SW039	4/12/90	Mercury	0 3	ug/L	0 01
SW039	11/17/89	Mercury	0 33	ug/L	0 01
SW039	4/15/92	Silver	2 7	ug/L	0 6
SW041	12/4/90	Silver	3 4	ug/L	0 6
SW041	12/4/90	Silver	3 4	ug/L	0 6
SW041	9/5/90	Silver	3 5	ug/L	0 6
SW041	11/5/90	Silver	9 8	ug/L	0 6
SW041	7/8/91	Silver	3	ug/L	0 6
SW041	11/5/90	Silver	9 8	ug/L	0 6
<b>Radionuclides</b>					
SW039	1/17/90	Americium-241	0 162	pCi/L	0 15
SW039	1/17/90	Americium-241	0 162	pCi/L	0 15
SW041	6/4/90	Gross Alpha	40 1	pCi/L	7
SW041	6/16/89	Gross Alpha	57	pCi/L	7
SW041	1/4/90	Gross Alpha	8 3	pCi/L	7
SW041	1/4/90	Gross Alpha	8 3	pCi/L	7
SW039	7/16/90	Gross Beta	23 69	pCi/L	8
SW041	1/4/90	Gross Beta	14 9	pCi/L	8
SW041	6/4/90	Gross Beta	36	pCi/L	8
SW041	6/16/89	Gross Beta	41	pCi/L	8
SW039	6/27/88	Plutonium-239/240	0 219	pCi/L	0 15











**Figure 3**  
**Ash Pits**  
**HPGe Data for**  
**Uranium 235 (pCi/g)**

**EXPLANATION**

● **HPG Loc'n**

**St d dM pF t re**

☐ Building destination

L k d p d

# Strom der

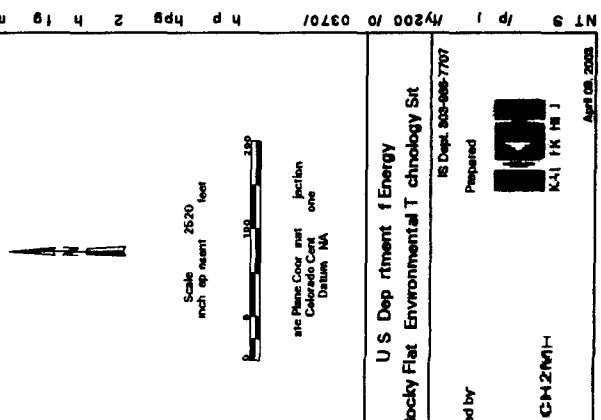
5

1  
2  
3  
4

— p ved

**DATA SOURCE BASE FEATURE**  
Buildings, fences, hydrography, roads and structures on 804 aerial fly-over data captured by GING FSL, Las Vegas. Digitized and on the hydrographs. 1/95  
Topographic contours were derived from digital vector terrain nucleus MK using DEM  
DEM  
ATM  
The DEM  
occurs the DEM data  
as captured by the nearest  
to the DEM  
V 94 Aerial Flyover  
DEM post-processing performed by MK, West

**NOT**





**Figure 4**  
**Ash Pits**  
**HPGe Data for**  
**Uranium 238 (pCi/g)**

### EXPLANATION

- HPG Lo ti
- St dia d M p f tur
- ☐ B l d g d h s t u c u r
- Lak d d
- S r m d t t c h e h
- dr age f e
- T g p h C nt (2 Fo )
- == P ved d
- D ro d

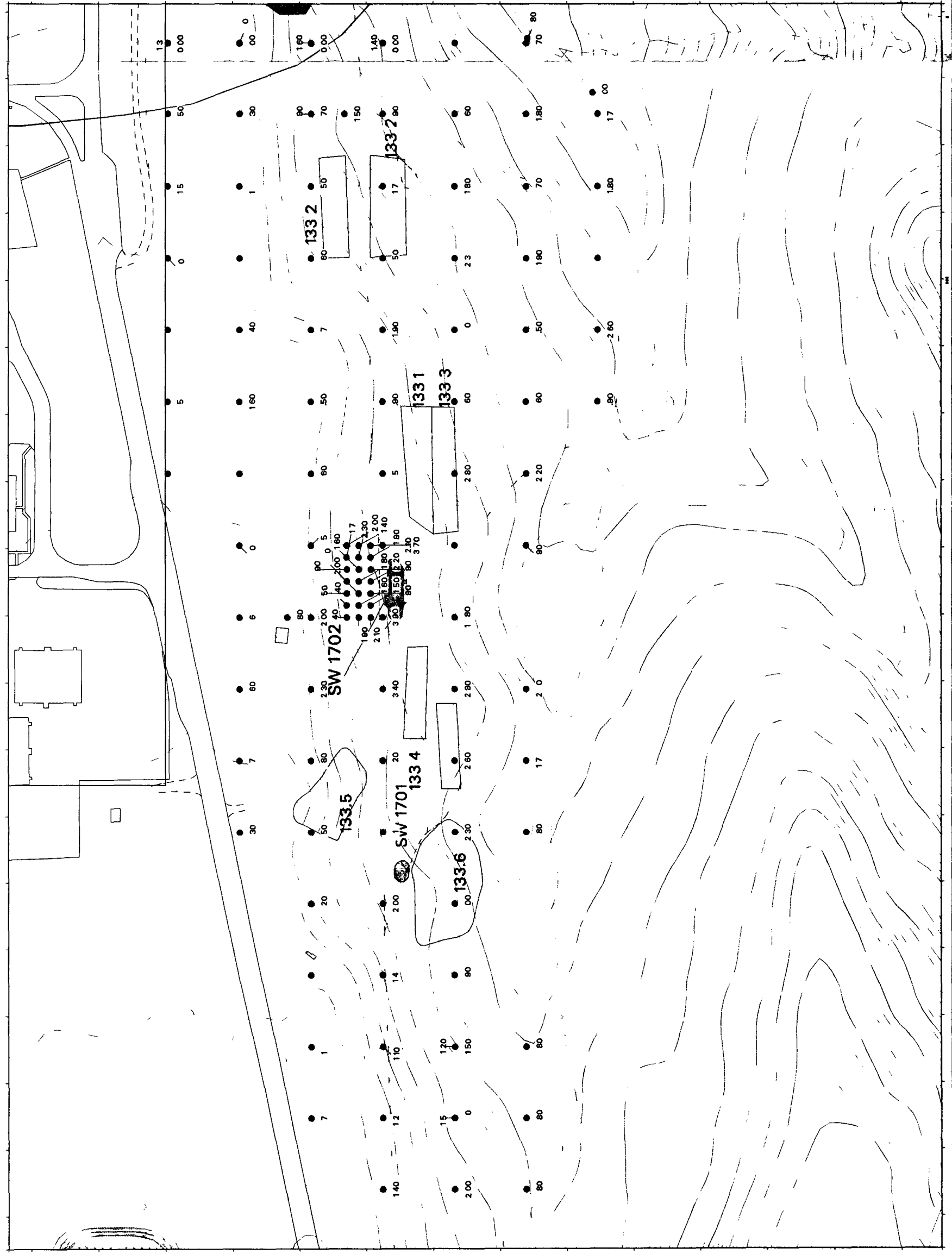
[illegible]



Figure 4a

IHSS 133 1  
Subsurface Soil  
Maximum Sampling Results  
Greater than Background  
Means Plus Two Standard  
Deviations

KEY

- IHSS
- PAC 1702
- Paved area
- Dirt road
- Stream ditch or drainage
- Sampling location

me he ed Gov rmen se  
age cy eo no he mployee  
ty es pi d or assume ny lega ably or  
pon or ac cy omple nes or se lnes  
osed r ma pa us rod or oces  
ow ed e would not nge



30 0 30 60 Feet

Scale = 1 1 350

State Plane Coordinate Projection  
Colorado Central Zone  
Datum NAD 27

U S Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by

Prepared for

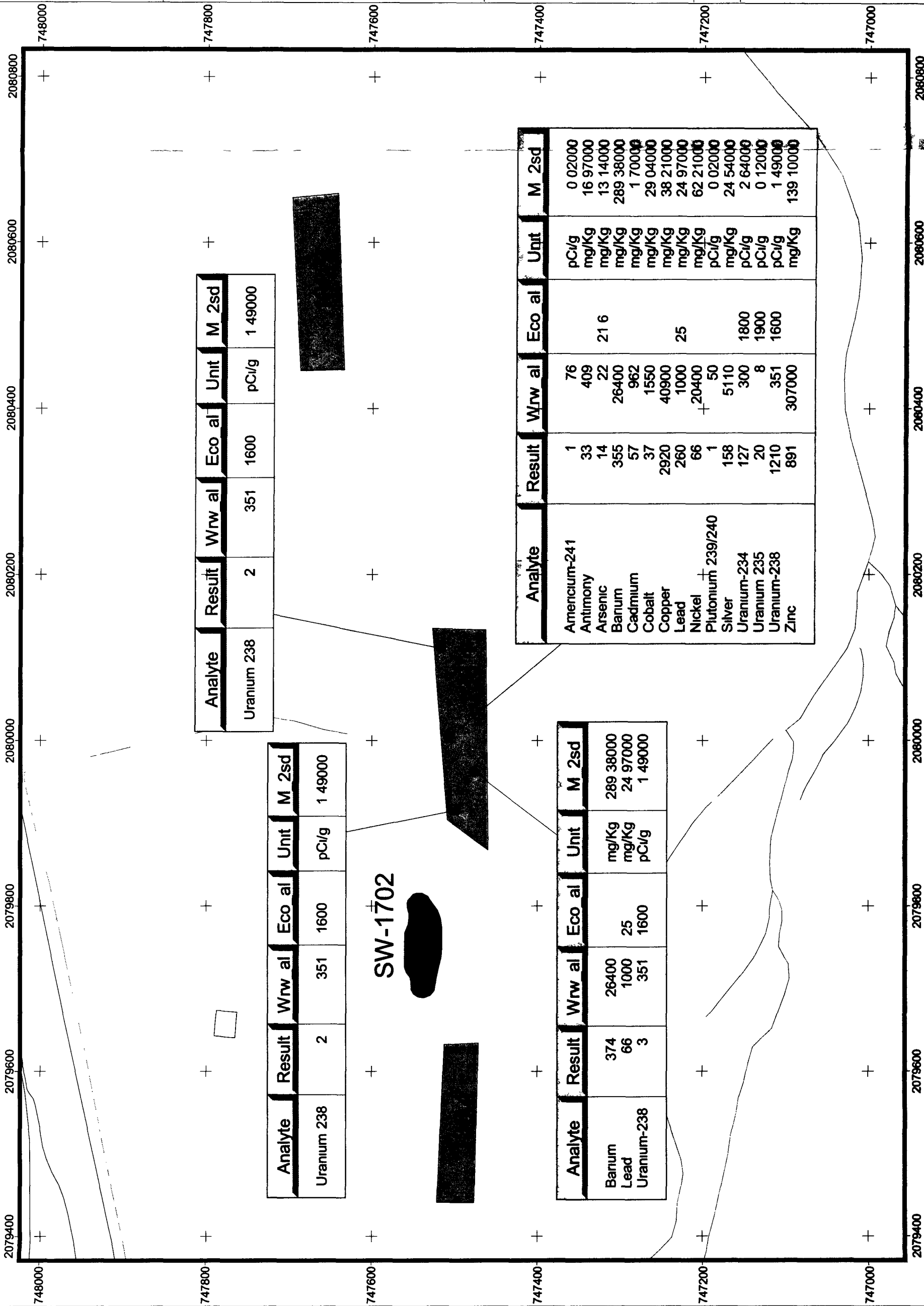




Figure 4b

IHSS 133.2  
Subsurface Soil  
Maximum Sampling Results  
Greater than Background  
Means Plus Two Standard  
Deviations

KEY



IHSS



PAC 1702



Paved area



Dirt road



Stream ditch or drainage



Sampling location

Not used on this map  
Employees of the company  
are not responsible for the  
accuracy of the data  
presented in this map  
or the results of the  
sampling program  
conducted by the  
company.



30 0 3060 Feet



Scale = 1:1700

State Plane Coordinate Projection  
Colorado Central Zone  
Datum NAD 27

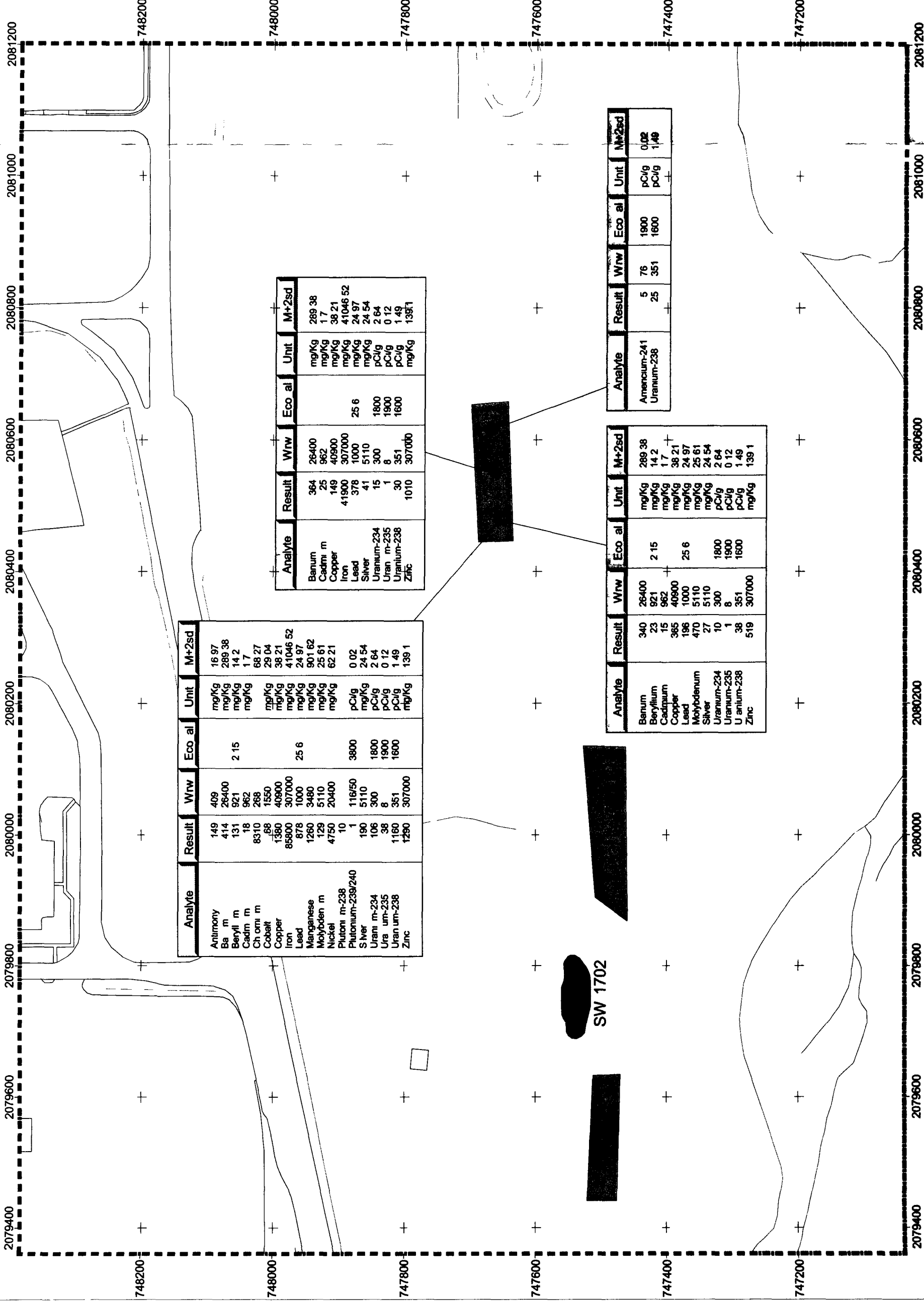
U.S. Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by

Prepared for



KAISER-HILL  
COMPANY



Analyte	Result	Wrw	Eco al	Unit	M+2sd
Barium	364	26400		mg/Kg	289 38
Beryllium	25	962		mg/Kg	17
Cadmium	149	40900		mg/Kg	38 21
Copper	41900	307000		mg/Kg	41046 52
Lead	378	1000	25 6	mg/Kg	24 97
Manganese	41	5110		mg/Kg	24 54
Molybdenum	15	300	1800	mg/Kg	2 64
Nickel	1	8	1900	pCi/g	0 12
Plutonium-234	30	351	1600	pCi/g	1 49
Plutonium-238	1010	307000		mg/Kg	138 1
Silver					
Uranium-234					
Uranium-235					
Uranium-238					
Zinc					

Analyte	Result	Wrw	Eco al	Unit	M+2sd
Americium-241	5	76	1900	pCi/g	0 02
Uranium-238	25	351	1600	pCi/g	1 49

Analyte	Result	Wrw	Eco al	Unit	M+2sd
Barium	340	26400	2 15	mg/Kg	289 38
Beryllium	23	921		mg/Kg	14 2
Cadmium	15	962		mg/Kg	17
Copper	365	40900		mg/Kg	38 21
Lead	196	1000	25 6	mg/Kg	24 97
Molybdenum	470	5110		mg/Kg	25 61
Silver	27	300	1800	mg/Kg	24 54
Uranium-234	10	8	1900	pCi/g	2 64
Uranium-235	1	351	1600	pCi/g	0 12
Uranium-238	38	307000		pCi/g	1 49
Zinc	519			mg/Kg	138 1

SW 1702



2079200

2079400

2079600

2079800

2080000

2080200

2080400

2080600

748000

747800

747600

747400

747200

748000

747800

747600

747400

747200

2079200

2079400

2079600

2079800

2080000

2080200

2080400

2080600

Figure 4c

IHSS 133 4  
Subsurface Soil  
Maximum Sampling Results  
Greater than Background  
Means Plus Two Standard  
Deviations

KEY



IHSS



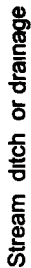
PAC 1702



Paved area



Dirt road



Stream ditch or drainage



Sampling location

SC he ed o ne se  
ty es or d s e pl yers a es  
pons or he c cy pl nes lab ly or  
d rma ppa e ha prod or oce  
n ow ed e ha wou o f nge



50 0 50 Feet

Scale = 1 1 400

State Plane Coordinate Projection  
Colorado Central Zone  
Datum NAD 27

U S Department of Energy  
Rocky Flats Environmental Technology Sit

Prepared by

Prepared for



KAISER-HILL  
COMPANY

File: see-1 notification  
posting map for subsurface apr Date May 2003

Analyte	Result	Wrw	Eco al	Unit	M+2sd
Uranium-238	2	351	1600	pCi/g	1.49

133 4

SW-1702

Analyte	Result	Wrw	Eco al	Unit	M+2sd
Antimony	28	409		mg/Kg	16.97
Barium	637	26400		mg/Kg	288.38
Cadmium	42	962		mg/Kg	1.70
Cobalt	34	1550		mg/Kg	29.04
Copper	957	40900		mg/Kg	38.21
Iron	107000	307000		mg/Kg	41048.52
Lead	935	1000	25.6	mg/Kg	24.97
Manganese	998	3480		mg/Kg	901.62
Nickel	83	20400		mg/Kg	62.21
Plutonium-239/240	1	507116		pCi/g	0.02
Silver	311	5110	3800	mg/Kg	24.54
Tin	579	613000		mg/Kg	286.31
Uranium-234	113	300	1800	pCi/g	2.64
Uranium-235	17	8	1900	pCi/g	0.12
Uranium-238	244	351	1600	pCi/g	1.49
Zinc	2390	307000		mg/Kg	139.10

Analyte	Result	Wrw	Eco al	Unit	M 2sd
Cadmium	14	962		mg/Kg	1.70
Copper	2520	40900		mg/Kg	38.21
Lead	163	1000	25.6	mg/Kg	24.97
Silver	56	5110		mg/Kg	24.54
Uranium-234	241	300	1800	pCi/g	2.64
Uranium-238	848	351	1600	pCi/g	1.49
Zinc	706	307000		mg/Kg	139.10



2079400

2079600

2079800

2080000

2080200

2080400

2080600

748000

747800

747600

747400

747200

748000

747800

747600

747400

747200

2079400

2079600

2079800

2080000

2080200

2080400

2080600

Figure 4d

PAC SW 1702  
Subsurface Soil  
Maximum Sampling Results  
Greater than Background  
Means Plus Two Standard  
Deviations

KEY



IHSS



PAC 1702



Paved area



Dirt road



Stream ditch or drainage



Sampling location

Analyte	Result	Wrw	Eco al	Unit	M+2sd
Uranium-238	2	351	1600	pCi/g	1 49

Analyte	Result	Wrw	Eco al	Unit	M+2sd
Americium-241	3	76	1900	pCi/g	0 02
Arsenic	21	22 2	21 6	mg/Kg	13 14
Barium	1680	26400		mg/Kg	289 38
Beryllium	446	921	2 15	mg/Kg	14 20
Cadmium	71	962		mg/Kg	1 70
Chromium	434	268		mg/Kg	68 27
Cobalt	701	1550		mg/Kg	29 04
Copper	8850	40900		mg/Kg	38 21
Iron	97400	307000	+	mg/Kg	41046 52
Lead	5200	1000	25 6	mg/Kg	24 97
Manganese	2150	3480		mg/Kg	901 62
Molybdenum	68	5110		mg/Kg	25 61
Nickel	325	20400		mg/Kg	62 21
Plutonium-239/240	7	50/116	3800	pCi/g	0 02
Selenium	7	5110		mg/Kg	4 80
Silver	209	5110		mg/Kg	24 54
Uranium-234	350	300	1800	pCi/g	2 64
Uranium-235	68	8	1900	pCi/g	0 12
Uranium-238	940	351	1600	pCi/g	1 49
Zinc	7220	351	1600	mg/Kg	139 10

SW-1702

Analyte	Result	Wrw	Eco al	Unit	M+2sd
Barium	380	26400		mg/Kg	289 38
Cadmium	35	962		mg/Kg	1 70
Copper	1150	40900		mg/Kg	38 21
Iron	106000	307000		mg/Kg	41046 52
Lead	881	1000	25 6	mg/Kg	24 97
Nickel	93	20400		mg/Kg	62 21
Plutonium-239/240	1	50/117	3801	pCi/g	0 02
Silver	125	5110		mg/Kg	24 54
Uranium-234	21	300	1800	pCi/g	2 64
Uranium-235	1	8	1900	pCi/g	0 12
Uranium-238	17	351	1600	pCi/g	1 49
Zinc	1420	351	1600	mg/Kg	139 10

the ed o r e e  
e v e eo nor he pl ee akes ry  
ty y he c cy me n legal baly  
pon a s od r ooe  
osed ep sen woul o nge



30 0 30 60 Feet



Scale = 1 1 300

State Plane Coordinate Projection  
Colorado Central Zone  
Datum NAD 27

U S Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by

Prepared for





Figure 5

## Area of Landslides and High Erosion Potential

### EXPLANATION

Areas of landslides and high erosion. Contaminated sites within these areas must be evaluated per Risk Screen 2 of Figure 3.

The anticipated boundary of areas that will be subject to institutional controls is subject to modification based upon characterization future response actions the results of the comprehensive risk assessment and the final remedial/corrective action decision in the final CAD/ROD. See Section 12.

Approximately 25 acres identified as proposed Wind Technology Expansion Area in Rocky Flats National Wildlife Refuge Act 2001.

### Standard Map Features

- Lake and pond
- Stream ditch or other drainage feature
- Fence and other barrier
- Rocky Flats Environmental Technology Site boundary
- Paved road
- Dirt road

### NOTES

- Reference:
  - Report S-11-ER
  - Sediment Transport Modeling for the Actinide Migration Evaluation
  - Rocky Flats Environmental Technology Site (August 2000)
  - Geological Mapping of the Rocky Flats Environmental Technology Site by S. J. Peterson and B. J. Peterson
  - Final Plant and Facility J. Peterson and B. J. Peterson
  - Colorado Geological Survey
  - Open File Report 94-162 Scale 1:6000
  - Site location base, OHR 94-162 (on map)
- Geological Mapping of the Rocky Flats Environmental Technology Site by S. J. Peterson and B. J. Peterson



State Plane Coordinate Projection  
Datum: NAD



29/29

